

*LEISURE ITEMS AS CONTROLS IN THE ATTENTION
CONDITION OF FUNCTIONAL ANALYSES*

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Leisure items (e.g., games, toys) are commonly made available as controls during attention conditions of functional analyses (Ringdahl, Winborn, Andelman, & Kitsukawa, 2002). However, Ringdahl et al. raised questions about this practice. This paper reviews research that supports and conflicts with the inclusion of leisure items as controls, including a quantitative analysis of relevant articles published in the *Journal of Applied Behavior Analysis* over a 10-year period. Data reviewed suggest that practitioners may consider omitting leisure items as controls or including such items strategically based on the accumulation of assessment information.

DESCRIPTORS: functional analysis, control conditions, leisure items, attention condition

Functional analysis methodology is firmly established as part of best practice in the development of effective treatments for problem behavior. In recent years, attention has been given to refining subtle but important aspects of this methodology. For example, studies have suggested the importance of considering discriminative stimuli such as therapist and room features (Conners et al., 2000); motivating operations such as satiation and deprivation (Berg et al., 2000; O'Reilly, 1999; Worsdell, Iwata, Conners, Kahng, & Thompson, 2000); rate and novelty of task presentation (Smith, Iwata, Goh, & Shore, 1995); session duration (Smith et al.; Wallace & Iwata, 1999); dimensions of reinforcement including magnitude (Fisher, Piazza, & Chiang, 1996), quality (Fisher, Ninness, Piazza, & Owen-DeSchryver, 1996; Richman & Hagopian, 1999; Taylor, Sisson, McKelvey, & Trefelner, 1993), and schedule (Borrero, Vollmer, & Wright, 2002); and potential confounding effects of reinforcers (Moore, Mueller, Dubard, Roberts, & Sterling-Turner, 2002). These sorts of refinement efforts

may lead to more effective and efficient practices that improve accurate identification of specific behavioral functions, a worthy endeavor given that functional analyses sometimes fail to yield clear outcomes (Derby et al., 1992; Kahng & Iwata, 1999; Vollmer, Marcus, Ringdahl, & Roane, 1995).

A recently published study in the *Journal of Applied Behavior Analysis (JABA)* raised questions about another aspect of functional analysis methodology—the common practice of including leisure items as available alternative stimuli during conditions designed to test for attention as a reinforcer (Ringdahl, Winborn, Andelman, & Kitsukawa, 2002). The results of Ringdahl et al.'s study suggest that the use of leisure items during attention conditions might obscure potential reinforcement effects by competing with attention-maintained behavior. The purpose of the current paper is to clarify issues involved in choosing whether or not to include leisure items in the attention condition of functional analyses and to offer suggestions for what data might be relevant in guiding practitioners and researchers in making this determination. The paper begins with a discussion of the rationale for including leisure items in the attention condition along with a review of supporting studies. Next, research with findings contraindicating the inclusion of leisure items in attention conditions are

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reviewed. Then, a quantitative review of recent studies that included a functional analysis is presented to examine inclusion of leisure items during attention conditions. Finally, based on the available data, suggestions are offered for future use of leisure items in attention conditions.

COMPETITION WITH AUTOMATICALLY MAINTAINED BEHAVIOR

Leisure items (e.g., toys, games) are commonly made available for participants to manipulate during the attention condition of a functional analysis. The rationale for doing so involves providing a control for automatically maintained problem behavior (Iwata et al., 1994). If leisure items or other forms of stimulation are not provided during the attention condition, then interpretive difficulties may arise because the occurrence of problem behavior during the attention condition might be related to either deprivation of social interaction (characteristic of an attention function) or general stimulus deprivation (characteristic of an automatic reinforcement function). According to criteria developed by field experts (Hagopian et al., 1997), an automatic reinforcement function can be presumed when high levels of responding are observed in all conditions or primarily in the alone condition. When problem behavior occurs primarily during the alone and attention conditions (but not in the others), several interpretations are viable depending on the relative rates of problem behavior in each condition. Hagopian et al. considered differentiated responding across two or more conditions to be indicative of multiple control. In the case of high response rates in both the alone and attention conditions, it is possible (but unlikely) that access to attention would be the sole function, although attention-maintained behavior should eventually be extinguished across repeated conditions without social reinforce-

ment (e.g., Vollmer, Iwata, Duncan, & Lerman, 1993; Vollmer, Marcus, & LeBlanc, 1994). On the other hand, Hagopian et al. advised practitioners to assume an automatic reinforcement function if rates of problem behavior are relatively higher in the alone condition. Of these potential outcomes, interpretation of the former scenario in which differentiated responding (of roughly equal proportion) is observed in the alone and attention conditions (but not in the others) seems to be the most problematic. Another possibility involves carryover effects when the alone condition follows the attention condition during multielement analyses.

A number of studies have shown that preferred leisure items do, in fact, sometimes compete with automatically maintained behavior. Based on the results of a stimulus preference assessment, Vollmer et al. (1994) included preferred leisure items in the attention condition of a functional analysis for 2 of 3 participants with self-injurious behavior (SIB). The functional analyses failed to identify social functions for either participant's SIB. For 1 participant, SIB was undifferentiated across conditions (with persistent responding in a no-interaction condition) but was noticeably lower during the attention condition. Providing free access to preferred leisure items during an enriched environment evaluation resulted in decreased SIB for all 3 participants compared to a no-interaction condition. Goh et al. (1995) reported mean levels of hand mouthing that were at least 70% lower during the attention and play conditions (with leisure items available in each) compared to an alone condition for 4 of 10 participants whose behavior was found to be automatically maintained. Although it is possible that therapist presence could have accounted for the suppressive effects observed during the attention and play conditions (rather than the effects of competing stimuli), subsequent analyses revealed that free access to various preferred leisure items was associated

with low levels of hand mouthing in the absence of a therapist for 3 of the 4 participants.

In another study (Shore, Iwata, DeLeon, Kahng, & Smith, 1997), 1 of 3 participants exhibited substantially lower levels of SIB with leisure materials present during the attention (4% of intervals) and play conditions (4% of intervals) compared to an alone condition (26% of intervals) of a functional analysis. Although percentages of item manipulation were not reported for the functional analysis, subsequent analyses showed that high levels of item manipulation did compete with SIB when both responses were freely available.

Successful competition between unreinforced leisure-item manipulation and automatically maintained problem behavior has also been reported in at least three other studies (Piazza, Adelinis, Hanley, Goh, & Delia, 2000; Ringdahl, Vollmer, Marcus, & Roane, 1997; Roscoe, Iwata, & Goh, 1998). Taken together, these studies suggest that inclusion of preferred leisure items in the attention condition of functional analyses may indeed help to minimize potential interpretative difficulties by providing competition between object manipulation and stereotypic problem behavior (as proposed by Iwata et al., 1994).

COMPETITION WITH ATTENTION-MAINTAINED BEHAVIOR

Although the justification for including leisure items in the attention condition seems clear, it is possible that the availability of leisure items may sometimes compete with attention-maintained behavior (masking this potential function). Speculation regarding this problem occurred as early as 1995 (Vollmer et al.), and several recent studies offer preliminary support. Ringdahl et al. (2002) compared the effects of the presence and absence of preferred leisure items (toy car, ball, noisemakers) during attention conditions of two analogue functional analyses. Although an alone condition was omitted (making it difficult to rule out an

automatic reinforcement effect) and leisure-item manipulation was not reported, the rate of problem behavior for both participants was lower in the presence of preferred leisure items than in their absence. Thus, Ringdahl et al. showed the potential for preferred leisure items to mask attention functions when provided during the attention condition of a functional analysis.

Other studies have yielded outcomes (albeit less directly) that support the results of Ringdahl et al. (2002). Following a stimulus preference assessment, Hanley, Piazza, and Fisher (1997) evaluated the effects of noncontingent access to an identified preferred leisure item (computer game) on 1 participant's attention-maintained destructive behavior. With attention extinction in effect, noncontingent access to the computer game immediately reduced destructive behavior to zero and was somewhat more effective than noncontingent access to the maintaining reinforcer (attention). Although reductions in destructive behavior theoretically could have been attributed to extinction rather than to access to the preferred leisure item, the authors noted that response suppression was immediate rather than gradual (which is uncharacteristic of extinction curves).

In another study (Fisher, O'Connor, Kurtz, DeLeon, & Gotjen, 2000), potential arbitrary reinforcers that could compete with or suppress attention-maintained destructive behavior were identified via a stimulus preference assessment (using procedures described by Piazza et al., 1998). During the assessment, the participant was free to interact with the stimuli presented or to receive attention for exhibiting destructive behavior (both responses were measured). Results of this assessment accurately predicted the participant's responding during a treatment evaluation involving the noncontingent delivery of either a high-preference stimulus (music) or a low-preference stimulus (Rainstick). Specifically, noncontingent music was associated with zero rates of destructive behavior,

Table 1
Interpretation Issues Related to the Use of Leisure Items in Attention Conditions

Type of behavioral maintenance	Leisure items present in attention condition	Leisure items absent in attention condition
Automatically reinforced behavior	Leisure items may control for automatically maintained behavior (desirable result).	Automatically maintained behavior may persist in the absence of competing stimuli (false-positive result).
Behavior reinforced by attention	Leisure items may compete with attention-maintained behavior, masking this potential function (false-negative result).	Attention-maintained behavior may be more likely to occur due to the absence of competing stimuli (desirable result).

whereas noncontingent Rainstick did not reduce destructive behavior in comparison to a control condition. The potency of the noncontingent music in this study is interesting given that extinction was not implemented. It should be noted, however, that the low-preference stimulus in this study was associated with moderately high levels of item interaction ($M = 68\%$ of the total duration across trials).

Thus, it seems that consumers of the functional analysis literature (including practitioners in applied settings) are left to mull somewhat complex and conflicting information concerning the inclusion of leisure items during attention conditions (see Table 1 for a summary of issues). Should practitioners begin omitting leisure items from the attention condition to eliminate potential competition with attention-maintained behavior? If so, how will control for automatically maintained behavior be accomplished? The issue is further complicated by the fact that automatic reinforcement and social-positive reinforcement both represent common maintaining variables (Iwata et al., 1994).

A QUANTITATIVE REVIEW OF
THE USE OF LEISURE ITEMS

In an attempt to reconcile the conflicting information in this area, we analyzed the inclusion of leisure items in attention conditions in all functional analysis articles published in *JABA* during a 10-year period (from 1994 through 2003). Although studies on functional analysis are published in a variety of journals, Hanley, Iwata, and McCord (2003) found that 65% of studies in this area are published in

JABA (through 2000).¹ Inclusion and exclusion criteria were similar to those reported by Hanley et al. Studies were categorized as including leisure items if such items were specifically mentioned (e.g., “Leisure items were freely available during the condition”). If the authors simply referenced a known functional analysis protocol (e.g., Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994; Northup et al., 1991) without providing details of the conditions, the inclusion of leisure items was classified as unspecified. If a detailed description of procedures was given without mention of leisure items in the attention condition, leisure items were scored as absent. Both authors independently categorized 32% of the articles. The number of articles for which the same results were obtained (e.g., both raters scored a “yes”) was divided by the total number of articles, yielding an interrater agreement score of 94%. The results of this analysis showed that 87 of the 165 studies (53%) clearly included leisure items during tests for attention as a reinforcer. The proportion of studies in which leisure items were clearly included during attention conditions was higher in the first half of the sample (1994 to 1998, 61% of 79 articles) than in the second half of the sample (1999 to 2003, 45% of 86 articles). This finding may reflect procedural drift, the development of idiosyncratic

¹To assess the extent to which our sample of *JABA* articles was representative of findings in other journals, a 5-year sample of articles published in another well-known behavioral journal (*Behavior Modification*) was analyzed in the same manner. The results of this analysis (conducted on nine articles) supported our findings from the review of *JABA* articles (data available from the first author).

laboratory protocols, or a nascent movement away from the use of leisure items as controls. Of the 165 studies, 78 (47%) were categorized as either unspecified or absent with respect to including leisure items. Of the 54 studies that did not clearly specify the inclusion of leisure items (unspecified), 49 (91%) cited the Iwata et al. (1982/1994) article. Given that it is likely that at least some of these 49 studies included leisure items (and simply omitted a detailed procedural description), these results suggest that many researchers do make leisure items available during attention conditions (as suggested by Ringdahl et al., 2002).

A second analysis involved counting the number of studies in which a stimulus preference assessment was completed as the basis for selecting leisure items to include in the attention condition. For purposes of scoring, a study was judged to include a stimulus preference assessment only if it cited an assessment method involving the actual presentation of stimuli and the direct measurement of responses (e.g., DeLeon & Iwata, 1996; Fisher et al., 1992; Pace, Ivancic, Edwards, Iwata, & Page, 1985). If a sufficiently detailed description of functional analysis procedures was provided without mention of using a formal stimulus preference assessment to identify leisure items, a stimulus preference assessment was scored as absent. An article that included a description of the contingency and at least one other detail (e.g., persons present) about the condition was considered sufficiently detailed. Preference assessments in the remainder of the studies were categorized as either not specified (i.e., if the study lacked sufficient procedural detail to make a determination) or not applicable (if no leisure items were used). Using the method described previously, overall interrater agreement was 83% across 32% of the articles. Of the 87 studies that included leisure items in the attention condition, only 5 (6%) indicated that leisure-item selection was based on results of a stimulus preference assessment.

In 75 of the 87 articles (86%), leisure items were scored as absent. Of the 141 articles scored as either not specified or positive for including leisure items, 33 (23%) were scored as not specified for using a stimulus preference assessment. Interestingly, authors (e.g., Ringdahl et al., 2002) occasionally described leisure items in the attention condition as being "preferred" despite the absence of a stimulus preference assessment. Thus, although a majority of researchers apparently use leisure items during the attention condition, very few reported formal (if any) strategies for ensuring the identification of preferred items. As a result, instances of false-positive identification of attention as a reinforcer may be more common than the current literature suggests because it is unlikely that less than preferred leisure items would compete with (or adequately control for) automatically maintained behavior. For example, Vollmer et al. (1994) evaluated preferred and nonpreferred leisure items as part of an intervention for individuals who exhibited SIB maintained by nonsocial variables. The results showed that SIB decreased (and item manipulation increased) only when preferred leisure items were available. Vollmer et al. noted, "These results demonstrate the value of a pre-intervention stimulus preference assessment; it was not the availability of stimulation per se that resulted in a decrease in SIB; preferred stimuli were required" (p. 336).

The articles reviewed were also categorized based on whether data on leisure-item manipulation in the attention condition were presented (e.g., in a table) or omitted. Interrater agreement for this classification was 98%. Specific data indicating the extent to which participants manipulated leisure items during the attention condition was absent in 100% of the studies reviewed, indicating a lack of attention to this variable. Only one study offered informal discussion of the extent of manipulation (Hanley, Iwata, Thompson, & Lindberg, 2000).

Apparently, examination of this type of data has not been necessary in determining behavioral function. Information regarding the selection of leisure items and manipulation levels may be omitted for editorial reasons (e.g., due to space constraints related to the type of article). Also, the use of formal selection procedures can be prohibitively time consuming. Thus, factors beyond the control of individual researchers may sometimes prevent more thorough methodology (or descriptions thereof) in this area. However, it is possible that such information may elucidate peculiar results. For example, some authors have interpreted diminishing rates of problem behavior during the attention condition as possibly indicative of punishment effects from the contingent delivery of verbal reprimands (e.g., Ellingson et al., 2000; Roscoe et al., 1998). In such cases, discussion of the amount of leisure-item manipulation in the attention condition may provide additional clarity (by ruling out the effects of competing stimuli).

A number of implications flow from the quantitative analyses discussed above. First, the robustness of Iwata et al.'s (1982/1994) functional analysis protocol has been demonstrated via hundreds of replications and extensions (as noted by Borrero et al., 2002; Hanley et al., 2003). For the most part, such progress seems to have occurred with the inclusion of leisure items of unknown preference value as a control for automatically maintained behavior. Given that it is unlikely that low-preference leisure items could compete with automatically maintained behavior (as found by Fisher et al., 2000), continued inclusion of leisure items of unknown preference value as a control does not seem to be justified. Second, even when researchers include leisure items (preferred or otherwise), data on leisure-item manipulation are not discussed and, apparently, are not considered necessary in determining behavioral function. However, the provision of more specific information on leisure-item selection

and the extent of leisure-item manipulation might be useful for planning treatment and distinguishing between punishment effects and effects of competing stimuli. Third, researchers' omission of *preferred* leisure items in the attention condition might minimize masked attention functions as well as the likelihood of false-negative identification of attention functions.

RECOMMENDATIONS

The analyses described earlier suggest two possible courses of action for practitioners and researchers. One option is to begin omitting leisure items from the attention condition. The omission of preferred leisure items as controls during the attention condition in most functional analysis research to date suggests that the inclusion of leisure items is, in most cases, unnecessary to isolate behavioral function. Although Ringdahl et al. (2002) suggested that researchers examine the effects of leisure items at different preference values, it may be difficult to identify items that would simultaneously control for automatically maintained behavior while not masking an attention function. Furthermore, this type of analysis seems to be time consuming with questionable benefits. If leisure items are omitted, further analyses may be required if differentially high rates of problem behavior are observed in both the alone and attention conditions. As a first step, practitioners might examine trends in within-session data (Vollmer, Iwata, Zarcone, Smith, & Mazaleski, 1993). For example, some authors have observed problem behavior primarily during the escape interval (in the absence of the relevant establishing operation) of demand sessions (Hagopian, Crockett, van Stone, DeLeon, & Bowman, 2000; Shore et al., 1997). This observation led to the conclusion that problem behaviors were not differentially sensitive to demands. Similarly, problem behavior that occurs with equal or greater probability in the presence of verbal reprimands compared to their absence in attention condi-

tions might detract from a hypothesis of maintenance via attention (with the converse pattern supporting such a hypothesis). Further clarity might be obtained by comparing non-contingent attention and contingent attention conditions (e.g., Ringdahl et al., 2002). Finally, as suggested by Vollmer and his colleagues (Vollmer, Iwata, Duncan, & Lerman, 1993; Vollmer et al., 1994), data from extended alone or no-interaction conditions may help to distinguish between social and nonsocial functions.

A second option is to make strategic use of leisure items (identified via a stimulus preference assessment) as controls for automatically maintained behavior. The sequential functional assessment model described by Vollmer et al. (1995) may offer a good framework (see Figure 1). Although Vollmer et al. focused on a progression from brief to more protracted functional analyses, the addition of less direct information-gathering activities (e.g., O'Neill, Horner, Albin, Storey, & Sprague, 1990), including interviews with caregivers and direct observations (conducted prior to undertaking an analogue evaluation), may be useful in gauging the probable benefit of using leisure items as controls. In fact, Vollmer et al. reported following this series of steps before the functional analysis with the addition of completing a stimulus preference assessment.

Following Figure 1, interviews with caregivers and direct observations during typical daily routines may provide information regarding the probability that problem behavior will occur during conditions of stimulus deprivation (e.g., Vollmer, Borrero, Wright, Van Camp, & Lalli, 2001). Also, the results of a stimulus preference assessment may demonstrate successful competition between leisure items and problem behavior (e.g., Ringdahl et al., 1997). If the convergence of information obtained from these sources indicates that problem behavior rarely occurs when an individual is alone (suggesting a social function), then omission of leisure items in the attention

condition may prevent potential competition with attention-maintained behavior (without needing to control for automatic reinforcement). On the other hand, if caregiver interviews and direct observations suggest that a problem behavior occurs across a variety of situations and contexts (including periods of stimulus deprivation), then consideration should be given to controlling for automatically maintained behavior during an attention condition (flowing downward in Figure 1).

Results of an initial brief functional analysis (e.g., Northup et al., 1991) might reveal the absence of problem behavior during the alone condition. In these cases, leisure items might be omitted (flowing to the right of Figure 1) when progressing to multielement analyses if the available data suggest a possible attention function. On the other hand, the occurrence of problem behavior during the alone condition of the brief analysis might warrant continued inclusion of leisure items in a subsequent multielement analysis (especially if moderate or high rates of leisure-item manipulation are observed during the attention and play conditions). At the level of the multielement analysis, if responding is slightly differentiated in the attention condition (with moderate to high levels of item interaction) but to a lesser degree than in the alone condition, further analyses may be needed to determine whether an attention function is being partially masked. Finally, as mentioned previously, extended alone or no-interaction sessions may help differentiate between attention and automatic reinforcement functions. Responding that does not persist in these conditions suggests a social function that can be confirmed using procedures described by Ringdahl et al. (2002). Similar procedures could be used in the event that responding continues during extended conditions of stimulus deprivation to distinguish between an exclusive automatic reinforcement function and multiple control (automatic reinforcement and attention reinforcement).

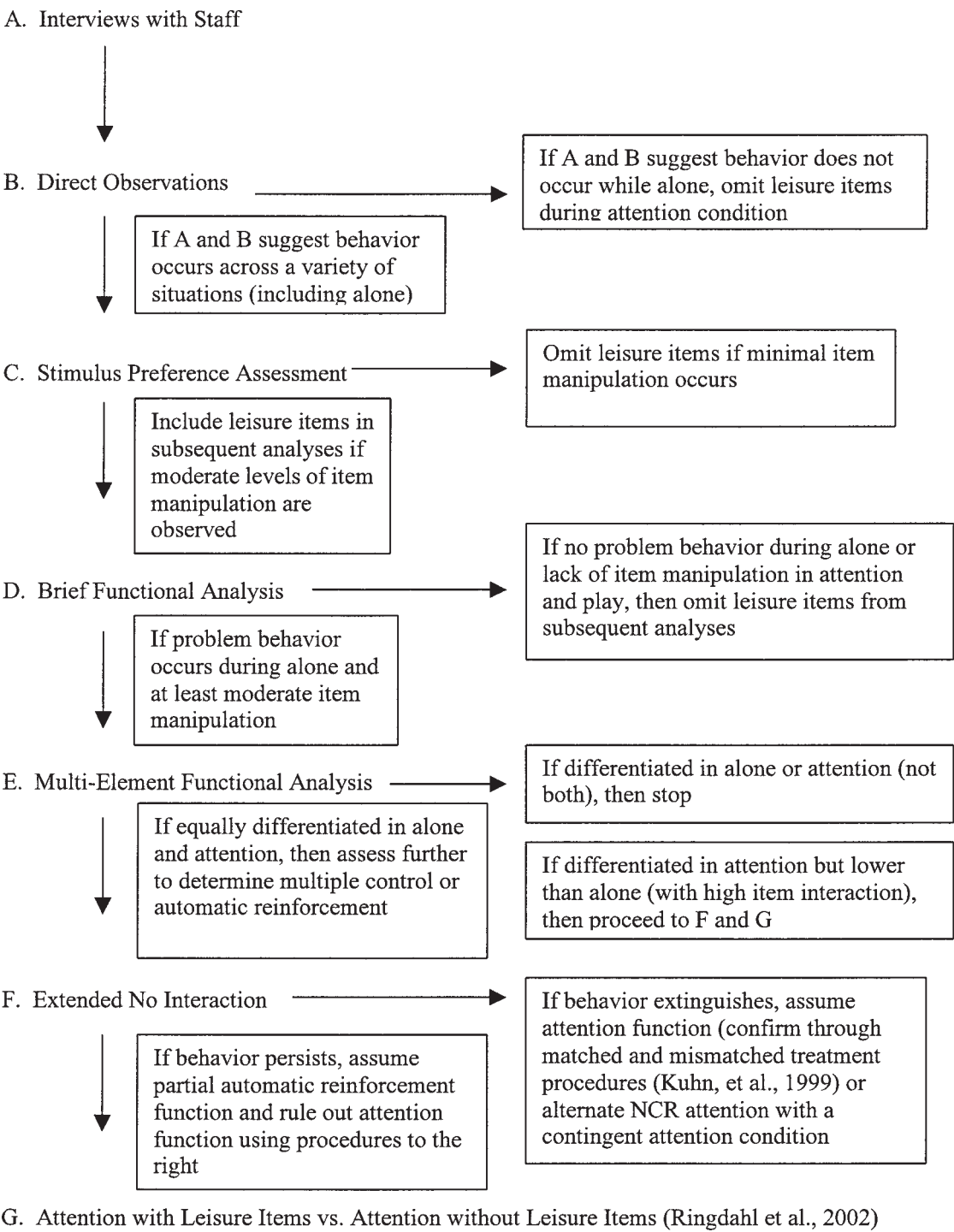


Figure 1. Decision-making flowchart for using leisure items during attention conditions.

CONCLUSIONS

Advances in the efficacy of functional analysis procedures have been made in recent years by researchers who have examined the finer aspects of this technology. Such progress is important not only from the standpoint of research but also in terms of informing practitioners in the field (see Vollmer & Smith, 1996, for a discussion of the utility of functional analysis methods for advancing both research and clinical practice). The question of whether or not to include leisure items as controls during the attention condition of functional analyses is a good example of an issue that can lead to useful refinements. To date, the preponderance of data suggests that practitioners will usually be able to identify a behavioral function without including preferred leisure items in the attention condition. However, consideration of converging information in a sequential functional assessment model (Vollmer et al., 1995) may assist practitioners in making more informed decisions. When researchers include alternative leisure items in the attention condition of a functional analysis, it is important that an accurate description of methodology, including item selection and perhaps manipulation levels, be provided. Such information will permit more thorough and critical evaluation of data.

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